FAA AVIATION NEWS

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COVER

Fresh powder on the slopes activates the pilot-skier. For safety tips on flying to ski, see page 8.

FAA AVIATION NEWS

DEPARTMENT OF TRANSPORTATION / **FEDERAL AVIATION ADMINISTRATION** VOL. 7 NO. 9

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David D. Thomas, *Acting Administrator, FAA*
Charles G. Warnick, *Director of Information Services*

Lewis D. Gelfan, *Editor*
Frank J. Clifford, *Assoc. Editor.* Abner B. Cohen, *Art Director*

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1968 AIRPORT PLAN: A Look Ahead

THE 1968 edition of the National Airport Plan (NAP), an annual appraisal of U.S. civil airport needs for commercial and private flying, urges the construction of more than 800 new airports within the next five years. These are needed to relieve present congestion and accommodate future growth.

The NAP, which is indirectly connected with the Federal-aid Airports Program (FAAP), is amended each year to keep in step with technical developments in aircraft and projected increases in air traffic. The plan lists airports by state and city, and recommends construction of new airports for the next five years, as well as improvements to most existing airports, including runways, taxiways, and other airport safety requirements.

A new entry in the 1968 airport plan is a recognition of need for 25 landing facilities for STOL aircraft, to serve the New York-Washington, D. C. corridor and in the Los Angeles and San Francisco areas. The nine new STOLports proposed for the New York area include four in Manhattan, and one each at LaGuardia and John F. Kennedy, and one each in Queens, Bronx, and Brooklyn. The estimated price tag for land and platforms (in Manhattan) alone would be $1.6 million.

At the present time, there are active STOL facilities at Dulles International Airport, Washington National, Logan International Airport (Boston) and LaGuardia. O'Hare International Airport in Chicago and Los Angeles International Airport are studying plans to convert taxiways to STOL use.

The feasibility of commercial air travel by STOLs and VTOLS is now under study by the Civil Aeronautics Board. While the appearance of STOLports in the NAP recognizes the potential value of STOLs, the text of the plan emphasizes that inclusion of STOLports in the NAP in no way suggests "a prejudgement of action which may be taken by the CAB."

The 1968 NAP spans fiscal years 1969 through 1973. It recommends construction of 808 additional airports, plus 31 heliports and four seaplane bases. In addition, the plan identifies specific improvements for 2,965 airports. The cost of all of this is an estimated $2.16 billion.

Of the 808 new airports recommended, 22 would be capable of accommodating airline aircraft. New air carrier airports are recommended for New York City, Boston, St. Louis, New Orleans, Chicago and Puerto Rico. Considering the large amount of land necessary for a major air facility, and the constant upward trend of land prices in urban areas, the NAP urges early and substantial investment by local public authorities.

The plan also calls for the construction of 748 new airports which would be for the exclusive use of general aviation aircraft, including STOLs, and 38 fields of limited runway length especially suited to the small non-transport type of aircraft widely used by Alaskan air carriers.

These 748 new airports would increase the number of general aviation airports listed in the plan to 2,214, of which 273 are classified as "relievers" to drain off light plane traffic from major air carrier hubs.

Least expensive of all airports to develop are heliports and seaplane bases. As the plan points out, a heliport requires only a helipad and associated taxiways, aprons, lighting and land for development and protection. Seaplane bases generally need breakwaters, floats, lighting and a modest amount of land.

The new issue of the National Airport Plan is a hefty 234-page look at U.S. airports as they are today, what the various long range requirements through 1980 are expected to be, and how they will fit into the constantly expanding aviation scene. These longer range requirements emphasize the long lead time required to prepare master plans, acquire land, obtain financing, and begin timely construction and future facilities.

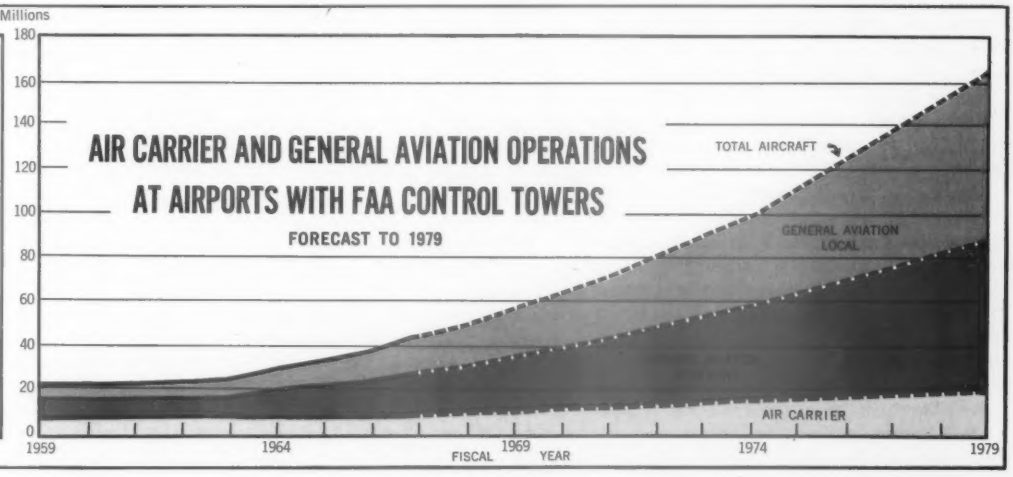
The 1968 NAP does not include estimates for improved airport terminals and other passenger handling facilities, nor does it obligate the Federal Government to award grants for proposed airport development under the Federal-aid to Airport Program. As always, primary responsibility for construction and improvement of the nation's airports rests with state and local authorities.

Copies of the 1968 Amendment of the National Airport Plan are available for $1.50 each from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. ■

MILLIONS

Fiscal Year	Air Carrier	General Aviation Itinerant	General Aviation Local	Total
1963	7.1	10.9	7.5	25.5
1964	7.4	12.4	9.3	29.1
1965	7.5	13.7	10.8	32.0
1966	8.2	16.2	13.5	37.9
1967	8.6	19.0	16.7	44.3
1968*	9.8	20.7	19.3	49.8
1969*	11.2	23.5	23.0	57.7
1970*	12.4	26.5	26.0	64.9
1971*	12.8	29.7	29.4	71.9
1972*	13.8	33.2	33.2	80.2
1973*	14.9	37.0	37.5	89.4
1974*	15.7	41.1	42.4	99.2
1979*	20.6	66.5	78.0	165.1

*Forecast



Controller College

New Careers in Air Traffic Control Begin at FAA Academy

Above—the Air Traffic Training Building, at FAA's Aeronautical Center adjoining Oklahoma City's Will Rogers Airport. Seventeen classrooms, newly equipped with audio-visual aids, will permit faster learning for some 2,400 new controllers who will train here this year. **Left**—two students at mock enroute radar console. The student in foreground listens to radio transmissions from pilot in adjoining room and updates flight progress strip.

EXPANDED training facilities at the FAA Academy will funnel some 2,000 new air traffic controllers yearly into the air traffic system to help handle the growing throngs of airway users.

During the past five years, FAA air traffic control specialists have been trained at active FAA towers, centers and flight service stations throughout the country. The new training program will consolidate all primary training at the FAA Academy at the Aeronautical Center in Oklahoma City, Oklahoma. Consolidation is expected to speed up training, while at the same time it will free air traffic personnel at FAA facilities to devote most of their working hours to handling air traffic.

Hundreds of applicants are being screened in each of FAA's regional offices to select those best qualified for the important work of controlling aircraft on the nation's airways.

Recruits who successfully complete the enroute or terminal training course may adavnce to full professional radar controller status within a few years, with grades ranging as high as GS-13 in some facilities (at an approximate salary of $14,500 based on the 1967 Salary Act, effective July 14, 1968).

Qualifications

FAA is especially interested in recruits who have had several years of progressivey responsible experience in administrative, professional, investigative, technical or other work involving responsibility for other persons. A degree from a university, or experience as a certified airline dispatcher or as a navigator or navigator/bombardier in the Armed Forces are also useful. Applicants who are "quality" graduates or who hold a Master's degree may enter training at a higher level.

An aptitude test, administered by the Civil Service Commission, examines various mental skills, including both verbal and abstract reasoning, numerical and alphabetical facility (ability to recognize whether a series of letters or numbers carries out a principle of logical development) and spatial relationships (identifying solid figures that can be made from an unfolded pattern). In addition, the test measures ability to make decisions regarding simple tasks from orally presented information. Finally, it tests ability to solve simple air traffic problems such as determining whether aircraft may be permitted to change altitude without violating a specified time separation rule.

All applicants must pass a medical examination similar to a Second Class Pilot's Examination. FAA designated physicians perform this examination, which pays particular attention to sight, hearing, speech, the heart, nervous and musculoskeletal systems. A candidate may be disqualified for color blindness, or for visual acuity not correctable to 20-50. No applicant with any form of heart disease, as indicated by electrocardiography, or with blood pressure higher than normal can qualify.

Individuals who wish to be considered for an air traffic control position should file form CS 500-C, available at all local post offices for an appointment to take the aptitude test.

Although all early training takes place at Oklahoma City, an applicant will be assigned to a facility in the region that hired him: if a man applies in New York, he will be assigned to an Eastern Region post after training at the Academy. However, an individual living in New York who wishes to work in a distant facility, in Texas for example, may apply to the FAA recruiting office in the Southwest Region.

After an applicant has successfully passed written and medical examinations, his name appears on the Civil Service Register in his region and he is eligible for appointment.

Above—student controllers learn to follow air traffic on radar scopes in laboratory simulating Air Route Traffic Control Center. **Left**—instructor at his console can flash multiple choice questions on the screen with a spin of the dial at his right. Row of lights at his left reveal students' answers. **Below**—student's multiple choice responder also tells him if he is right.

His minimum starting salary will be in the area of $6,000 or higher, depending upon his previous experience.

Air traffic trainees arriving at the FAA Academy begin with a four-day indoctrination. Students are briefed on the organizational and operational structure of the Federal Aviation Administration and its relationship to the Department of Transportation. Recruits are then separated into three groups for specialized training leading to careers as Air Traffic Control Specialists in terminals, centers, or flight service stations. Split up into classes of 20, they are ready to begin formal training in air traffic control.

The seven subjects a student must study, regardless of the option selected are: (1) Federal Aviation Regulations, (2) weather, (3) air navigation, (4) communication procedures, (5) terminal control procedures, (6) flight assistance service, and (7) enroute control procedures.

Students enjoy the benefits of modern teaching techniques and equipment. Departing from the traditional subject-oriented, lecture-type approach, the agency has adopted a "student-centered, task-oriented" approach. Instead of seven air traffic control subjects being taught separately, they are combined in one comprehensive problem-solving course involving typical air traffic situations. Solutions of the problems require the development of knowledge in the seven subject areas.

For example, one of the first tasks an air traffic controller needs to perform in handling aircraft is the preparation of a flight strip. Preparing a flight strip requires knowledge of certain Federal Aviation Regulations that pertain to flight plans—so these FARs are memorized. Estimated time of arrival is also an important part of a flight strip, and since the calculation involves an understanding of wind effects on flying time, this brings in the need for comprehension of weather phenomena. Later, learning how to control aircraft aloft, enroute and terminal students will find it necessary to know the FARs covering the pilot's responsibilities for following clearances, ATC procedures, etc.

To speed up the learning process, 17 Academy classrooms have been equipped with modern "responder" equipment for air traffic instruction.

Training Aids

Each classroom is outfitted with an instructor's monitor podium, from which he can control a rear screen projection wall with motion picture and slide capability. Desks for 20 students are equipped with responder buttons labeled A, B, or C. Three rows of buttons, corresponding with those on the students' desks and labeled with their names, appear on the instructor's monitor.

The instructor can present a point to the class, illustrate it with motion picture footage or slides, and then flash on the screen a series of multiple choice test questions about the material just presented. Instead of one student being called on to answer, every student must answer by pushing the button on his desk corresponding to the answer he thinks is correct.

The instructor can see at once what proportion of the class is successfully grasping the subject. He is able to identify students who are having difficulty without making their identity known to the class. He can pace his presentation of new material according to the responsiveness of the majority of his students.

After completing five weeks of classroom work, students will spend half a day in laboratories designed to simulate the environment in which a trainee will find himself after leaving the Academy.

Nancy Koplinka

(Part II of this article will describe the specialized training for terminal controllers, enroute controllers and flight service specialists.)

STATUS OF THE FEDERAL AVIATION REGULATIONS

As of December 12, 1968

With the October 1968 issue, FAA AVIATION NEWS began publication of a quarterly report on the status of all Federal Aviation Regulations, showing additions and deletions, number of changes, and purchase price.

Changes are normally sent automatically without charge to purchasers of Federal Aviation Regulations. Check or money order for FARs should be made out to "Superintendent of Documents" and sent to:

U.S. Government Printing Office
Washington, D.C. 20402.

FAR PART NO.	TITLE	PRICE	CHANGES
1	Definitions and Abbreviations	$0.35	15
11	General Rule-Making Procedures	.20	8
13	Enforcement Procedures	.25	7
15	Nondiscrimination in Federally Assisted Programs of the Federal Aviation Administration	.20	....
21	Certification Procedures for Products and Parts	.60	20
23	Airworthiness Standards: Normal, Utility, and Acrobatic Category Airplanes	1.25	6
25	Airworthiness Standards: Transport Category Airplanes	2.25	18
27	Airworthiness Standards: Normal Category Rotorcraft	.70	3
29	Airworthiness Standards: Transport Category Rotorcraft	.75	4
31	Airworthiness Standards: Manned Free Balloons	.20	2
33	Airworthiness Standards: Aircraft Engines	.40	3
35	Airworthiness Standards: Propellers	.30	2
37	Technical Standard Order Authorizations	1.00	5
39	Airworthiness Directives	.10	1
43	Maintenance, Preventive Maintenance, Rebuilding, and Alteration	.30	9
45	Identification and Registration Marking	.20	6
47	Aircraft Registration	.25	5
49	Recording of Aircraft Titles and Security Documents	.20	4
61	Certification: Pilots and Flight Instructors	.70	29
63	Certification: Flight Crewmembers Other Than Pilots	.35	9
65	Certification: Airmen Other Than Flight Crewmembers	.35	12
67	Medical Standards and Certification	.25	6
*71	Designation of Federal Airways, Controlled Airspace, and Reporting Points	.20	4
*73	Special Use Airspace	.20	1
*75	Establishment of Jet Routes	.20	2
*77	Objects Affecting Navigable Airspace	.35	6
91	General Operating and Flight Rules	.70	37
93	Special Air Traffic Rules and Airport Traffic Patterns	.35	13
**95	IFR Altitudes	.20	....
**97	Standard Instrument Approach Procedures	.20	1
99	Security Control of Air Traffic	.25	6
101	Moored Balloons, Kites, Unmanned Rockets and Unmanned Free Balloons	.20	2
103	Transportation of Dangerous Articles and Magnetized Materials	.20	5
105	Parachute Jumping	.20	4
121	Certification and Operations: Air Carriers and Commercial Operators of Large Aircraft	1.50	30
123	Certification and Operations: Air Travel Clubs Using Large Airplanes	.25	....
127	Certification and Operations of Scheduled Air Carriers with Helicopters	.35	10
129	Operations of Foreign Air Carriers	.20	4
133	Rotorcraft External-Load Operations	.20	3
135	Air Taxi Operators and Commercial Operators of Small Aircraft	.35	5
137	Agricultural Aircraft Operations	.25	3
141	Pilot Schools	.35	7
143	Ground Instructors	.20	3
145	Repair Stations	.40	8
147	Mechanic Schools	.20	1
149	Parachute Lofts	.20	1
151	Federal Aid to Airports	.40	23
153	Acquisition of U. S. Land for Public Airports	.20	3
155	Release of Airport Property from Surplus Property Disposal Restrictions	.20	....
157	Notice of Construction, Alteration, Activation, and Deactivation of Airports	.15	1
159	National Capital Airports	.30	10
161	(Deleted effective 6/1/66)		
163	(Deleted effective 7/1/65)		
165	Wake Island Code	.30	1
167	Annette Island, Alaska, Airport	.15	—
171	Non-Federal Navigation Facilities	.25	4
181	(Rescinded 4/1/67)		
183	Representatives of the Administrator	.20	Re-issued March 1968
185	Testimony by Employees and Production of Records in Legal Proceedings	.20	"
187	Fees	.20	"
189	Use of Federal Aviation Administration Communications System	.15	"

* Changes to individual airspace designations and airways descriptions, individual restricted areas, and individual jet route descriptions are not included in the basic Parts 71, 73 and 75 respectively because of their length and complexity. Such changes are published in the Federal Register and are included on appropriate aeronautical charts.

** Due to the complexity, length, and frequency of issuance, enroute IFR altitudes and instrument approach procedures are published in the Federal Register, the Airman's Information Manual, and are depicted on the aeronautical charts. Therefore, they are NOT included in the basic Parts 95 and 97.

FROST IN THE COCKPIT

External icing conditions are not the only hazard to winter flight. Neglecting to check for cabin heat before takeoff can result in dangerous interior icing and zero visibility.

THE temperature on the ground at O'Hare International was just below the freezing level when the sleek little business jet took off at noon. The sun streaming through the window glass made the cockpit quite comfortable—but not for long. As the aircraft zoomed up to FL 350 and headed west toward San Francisco, the chill air inside was numbing the hands that were fumbling ineffectively with the cabin heat control: nothing doing. They headed back to O'Hare.

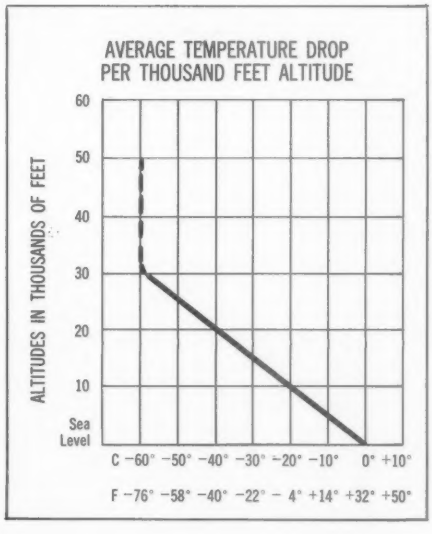
During descent the cockpit fogged and both pilots had to lean forward to read the gauges. After passing through a cloud layer, the instrument faces appeared frosted over and had to be rubbed repeatedly with a handkerchief. The windscreen began to ice up. An ILS approach brought them in over the runway and they managed to set the aircraft down safely despite the obscured windshield, whereupon both pilots, sweating visibly despite the subfreezing temperature, made a solemn vow: never again would they take off in the wintertime without first making certain that the cabin heat was functioning properly.

Checking the cabin heater as part of the winter preflight is in order for all pilots, whether the aircraft has a 40,000 or a 10,000 foot ceiling.

In many light aircraft, the linkage between the cockpit control and the heat-producing mechanism occasionally becomes jammed and inoperative. Ice or slush may freeze in the system and cause a blockage; corrosion or friction may bring about a break in the lines. Even the more sophisticated cabin heating systems are subject to mechanical failure, as in the example cited. Taking the necessary moment to check for adequate performance of the heater while still on the ground may prevent anxious moments in the air, should a failure exist.

The importance of preflighting for cabin heat is not limited to the northern or mountainous areas of the country. Cold air is always present at altitude. In the lower and middle altitudes, there is an average drop in temperature of 2.0 degrees Centigrade (3.6 degrees Fahrenheit) for every 1,000 foot increase in altitude. This means that if the ground level temperature is near the freezing point, at 10,000 feet the outside thermomenter will read approximately −20°C. (−4°F.).

The actual variation in temperature with altitude, the so-called "lapse rate," varies according to atmospheric conditions; it is possible to encounter a gradation of −3°C. for every 1,000 feet within a given range of altitude. This means that while climbing to an altitude of only one mile above the ground, a temperature drop of 10°C. (18°F.) could be experienced.



Without adequate cabin heat, subzero air can reduce cockpit visibility to zero in a matter of seconds. Moisture from the pilot's breath may be sufficient to fog or even ice windows and windscreens. Pilots caught in such a predicament have had to improvise frantically with plastic credit cards or clipboards as ice scrapers, while striving to keep the airplane level and on course.

Attempting to continue a flight once a failure has been discovered in the heating system is foolhardy. If the failure becomes known after the aircraft is aloft, the pilot should make his condition known to Air Traffic Control and, if necessary, request vectors to the nearest airfield.

If the aircraft has a canopy, it should be opened, if feasible, to prevent the accumulation of moisture in the unheated cockpit, where it may condense or freeze on windows. Air vents and movable windows may also be utilized for this purpose. Unpleasant as exposure to subzero air may be, it does not compare with the discomfort of zero visibility, especially for the pilot who is not instrument rated or equipped.

Although the likelihood of cabin heat failure occurring in flight is small, it does happen. For this reason, no pilot should attempt to fly through wintry skies without the presence of some cold-weather gear in the airplane—a pair of warm gloves within reach, and some kind of hooded windbreaker, at the least. It's better to be super careful than to take a chance on being supercooled. ■

The Skiers' Fly-In

LAKE Tahoe, a gemlike body of water high in the Sierra Nevada Mountains of California, has been a mecca for summer vacationing pilots ever since the airport was opened at the south end of the lake. In recent years, the increasing number of pilot-skiers has made the airport a year around holiday landing field. The commissioning of an FAA Control Tower in 1965 attracted air carrier services as well as air taxi and charter aircraft. More than 40,000 operations a year are logged at Lake Tahoe Airport now, and the great majority of these are carried out without difficulty, summer and winter. Nevertheless, each season brings some new pilots to the area whose unfamiliarity with operating on the high ground occasionally results in tragic accidents.

Whether the probable cause of the accidents experienced by light planes at ski resort airports is given as "failure to maintain flying speed," or "turbulence on runway," or "deteriorating weather," the key word in virtually all cases is *unfamiliarity*. Pilots who have flown hundreds of hours in one particular aircraft and who believe that they know their machine in and out are frequently unprepared for the behavior that sets in when the airport is over a mile high, and when mountain peaks limit the airspace and set up unpredictable currents of air.

Lake Tahoe Airport, at 6,262 feet above sea level, is a typical example of a mountain resort airfield. The second highest airport in the United States with an FAA tower (Santa Fe, N. Mex. is the highest at 6,344 feet), Tahoe has a single north/south 8,500 foot runway, nestled in a narrow valley just south of the lake. Except for the northern or lake end, the airport is rimmed by high peaks, some well over 10,000 feet. Getting a light plane in and out of the area, for a pilot who is unfamiliar with the terrain, can vary from deceptively easy, to almost impossible, from one day to the next.

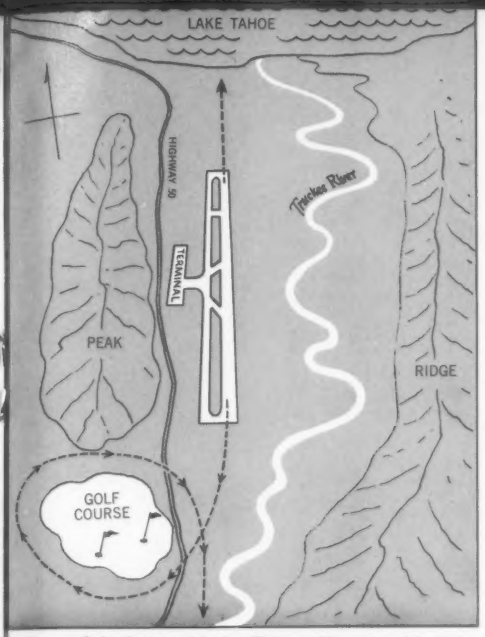
Local Turbulence

Unfamiliarity can become a factor the first time a pilot approaches the airfield from the lake end of the field if he has not learned about the prevalence of turbulence on the runway. The tower will usually warn itinerant aircraft of this local phenomenon, but dealing with it safely is a matter of piloting skill and preparation.

A common error made by pilots not experienced in mountain flying is failure to adjust the fuel mixture properly on takeoff or landing. "Full rich" mixtures will not give maximum power at mile high airfields, and could even produce misfiring during climbout. Experienced pilots tune the mixture by ear, with one eye on the tachometer.

Tower personnel at mile-high South Lake Tahoe Airport caution pilots to be prepared for clear air turbulence on runway.

Left—in the thin air of Lake Ta
area over the golf course to ga
for the pass. **Above**—seasoned
valley so all available airspace



Left—aerial photo of Lake Tahoe Airport, with Lake Tahoe in the background. **Above**—diagram shows how a pilot can gain altitude over the abandoned golf course before attempting to fly through the treacherous mountain passes to the south.

Piloting yourself to the powdery slopes? Try a "group lesson" in the cockpit.

f Lake Tahoe a wise pilot takes full advantage of the open rse to gain nearly all the altitude needed before heading easoned local Tahoe pilot hugs left hand wall of mountain airspace may be used if a turn becomes necessary.

As the proportion of oxygen in the air decreases, the fuel mixture must be leaned before cruise altitude is reached, and adjustments should be made continually, as needed, when crossing mountain passes.

The use of flaps while climbing out in a confined, mountainous area is a practice sometimes indulged in by inexperienced pilots when they find that their rate of climb is much less than anticipated. The result penalizes the aircraft's performance, perhaps to a dangerous degree. Most light planes climb best when aerodynamically "clean." Furthermore, the use of flaps makes a light aircraft more vulnerable to the sudden onset of clear air turbulence, frequently encountered in the mountains.

The runway at Lake Tahoe Airport, like that at most elevated airfields, is long—8,580 feet; normally, there is ample runway for all types of general aviation aircraft to land and takeoff. Nevertheless, experienced local flyers, even when flying very light single-engine aircraft, give themselves all the runway in taking off. In fact, running turns are recommended under light wind conditions, as providing an extra measure of leeway for the departing aircraft.

One of the most serious errors committed by pilots new to the Tahoe area is failure to gain sufficient altitude with climbing turns over open areas before heading for the pass through the rim of surrounding peaks. When departing to the north, it is a simple matter to gain a safe altitude with climbing turns over the lake, before setting out for Reno or San Francisco. Yet, some pilots impatiently head directly for the pass, assuming with false confidence that they will be able to pick up sufficient altitude by the time they enter the pass.

Climbing for Altitude

Departing Tahoe to the south, the situation is more critical. The pilot heading for Echo Summit very soon finds himself hedged in by tall peaks, often shrouded in fog or clouds, with little room to turn. The importance of gaining a safe altitude before running out of turning room dawns on him very significantly. Local pilots often use the small golf course, lying just west of Highway 50, to gain virtually all the altitude they expect to need for crossing the pass.

When entering a narrow pass, such as Echo Summit, some pilots decide that safety lies in flying directly up the middle. The error of this decision becomes apparent whenever they find themselves forced to make a 180 degree turn without losing altitude. Wisdom lies in flying cautiously along one wall of the pass, so that all of the available airspace may be used if a turn becomes necessary.

Pilots who fly around mountains soon learn to "play" the wind. If they encounter an updraft on one side of a ridge, they look for a downdraft on the opposite side. They also learn to read the wind on the mountain side, in terms of blowing snow, snow cornices, and the inclination of trees. Old-timers are able to sniff out favorable air currents and ease their way over mountains under conditions where newcomers would be fighting a grim battle with the weather.

A key element in proper handling of an aircraft in the rough air frequently encountered in the mountains is a relaxed—although not inattentive—hand on the controls. Pilots under tension are too rigid to be responsive to the airplane when it is buffeted by air currents.

Familiarization Flights

The best safeguard against the kind of flying error that could lead to an accident is a local familiarization flight. Both single engine and twins are available for hire at Lake Tahoe Airport, with experienced check pilots who know all of the local hazards and are more than willing to point them out to visiting pilots. They will demonstrate the use of power in countering turbulence over the airfield, the best climb angles for given aircraft type, the proper mixture adjustments and flap handling. They will point out the "climb corridors," the best approach to shortened Runway 36 (6,500 feet), etc.

The belief that accidents at mountain resort airfields can be prevented by education is bolstered by the dramatic safety improvement at Lake Tahoe. In the summer, two years after the tower was in use, local newspapers reported there had been 35 accidents involving 17 fatalities at or near the airport during these two years. Soon afterward, a concerted drive was launched to familiarize visiting pilots with the hazards of flying out of a high altitude airport. FAA tower and GADO personnel joined hands with local airmen, airport and fixed-base operators in impressing newcomers with the importance of learning mountain flying before an accident occurred. During the following year, fatal accidents in the area of Tahoe Airport dropped to zero.

The same enthusiasm which draws thousands of pilot-skiers to Lake Tahoe is in evidence at dozens of mountain resort airports all over the country, from the western coastal ranges to the Rockies to the Appalachians. Many accidents can be avoided if pilots would learn to recognize their limitations on wings as readily as they do on skis.

Flying to ski can be half the fun of skiing, and perhaps less accident prone, when professional guidance is relied upon rather than blind confidence and guess work. Save the thrills for the slopes.

Lewis Gelfan

Area navigation could provide a choice in route selection to avoid dangerous weather.

AREA NAVIGATION

The Shortest Distance Between Two Points

Second half of an article dicusssing the applicability of area navigation to the air traffic system. This installment covers some of the advantages and problems that may be anticipated.

THUS far, we have talked only about predefined and published applications for area navigation. Another very important facet of this system is its flexibility of choice in selection of routing. This is seen as a useful tool for the controllers. Let's look first at this capability as a supplement to radar control.

Under our present system, if off-course vectors are required for separation of opposite direction or in-trail aircraft, course guidance must be provided until the aircraft is back on its cleared route. With area navigation, this same type situation could be greatly simplified by instructing the pilot to fly a parallel course five miles right or left. The controller simply monitors his radar display to ensure adherence to radar separation standards. All course guidance remains in the cockpit, resulting in a reduction of voice transmission and the chance of pilot disorientation.

More flexible routing capability will greatly reduce radar vectoring requirements for weather avoidance. Today, under severe weather conditions, a radar controller frequently finds himself vectoring virtually all aircraft under his control. With area navigation capability, a single clearance to each aircraft could provide complete routing through the trouble area. The controller would be able to devote less of his time to navigating and more to his primary duty of separating aircraft.

Development and implementation of such a system is not an easy task; nor should this system be construed to be a panacea for all the ills that plague the air traffic control system.

Many problems remain to be solved. Several projects, in cooperation with private industry, are under way to find solutions to these problems and explore ways of developing the full potential of the system.

Trial Project

Currently in progress is an airline evaluation called the Northeast Corridor Project. Pilots of several airlines are employing area navigation equipment and techniques on regularly scheduled flights. These flights, of course, rely on the safeguards of ATC radar monitoring as well as on conventional VOR/DME capabilities in the aircraft. The purpose of this evaluation is to examine the feasibility of using area navigation in an operational environment.

This project is limited to examination of only the enroute environment, since traffic densities in our northeastern terminals seldom permit the handling of special flights that do not conform to general traffic flow. Even in the enroute environment, heavy traffic often forces these evaluation flights to remain on conventional routes. This is unfortunate, but it does serve to emphasize the importance of careful procedure development. We must develop not only full-scale area navigation procedures, but we must also provide for the ever changing ratio of specially equipped to non-equipped aircraft.

The Northeast Corridor project is providing valuable data to the airlines and

equipment manufacturers, as well as to FAA. The airlines are able to develop pilot procedures and techniques while seeing for themselves the advantages to be realized from such a system.

The equipment manufacturers are provided the best possible test-bed for their products. By seeing their equipment used in an operational environment, they are better able to anticipate what will be expected by the users. Several recommended equipment design changes have already been incorporated as a result of this project.

Another airline evaluation is in progress using area navigation routes between Chicago and New York. It is proposed that eventually these routes be extended to the West Coast. This would provide a good look at the system under a broad range of conditions.

Another evaluation is being carried out by the Flight Standards Service of the FAA. Area navigation equipment has been installed in FAA aircraft to provide a test-bed that is not limited to scheduled times and routes. The objectives are to determine potential application, technical standards, and system accuracy.

The findings from all the evaluations will be the basis on which FAA will develop separation standards, weather minimums, equipment standards, and operating procedures for pilots and controllers involved in area navigation.

Introduction of area navigation into the air traffic control system will, as you might expect, have far reaching effects on future planning of airspace utilization. Before moving further in this direction, we need the answers to some very important questions:

1. Is this concept good enough to commit our national planning in this direction? What alternatives exist?

2. Is area navigation economically feasible for the aviation industry? What will be the average cost per airplane?

3. Can we safely introduce this concept?

In attempting to answer these questions, we must look far into the future and attempt to anticipate every possible impact of area navigation.

One such look into the future is a simulation to be conducted in the air traffic control laboratory of FAA's National Aviation Facilities Experimental Center (NAFEC) in Atlantic City, New Jersey. This simulation is to be based on the New York terminal area, including the satellite airports, and will be predicated on area navigation as the primary system in use by the flying public. Twenty percent of the simulated traffic will not be equipped, however, to provide a look at the ATC system's ability to accommodate special cases.

Future Problems

This simulation is expected to provide us with insight into future airport design consideration, NAVAID placement, route alignment and desirable airborne equipment capabilities.

Future study groups will have to consider many other questions. Not the least of these will be the flight inspection requirements. Today, our flight inspections concentrate on published procedures which are based on specific radials and courses of our NAVAIDS. Safe altitudes are based on course guidance reliability and terrain clearance along these specific routes. Area navigation will use all of the courses and radials. We need to develop methods of determining minimum reception and terrain clearance altitudes for the entire service volume of these facilities. Then we must develop the best methods of notifying the flying public of these minimums.

Assuming for a moment that the answers to all the technical questions can be found, we must also assure ourselves that we are not proceeding in conflict with plans to which we are already committed. Nationwide development of the NAS Stage A computer system is already well underway. We must develop a means of accommodating area navigation flight plans in this automated environment. For example, route definition techniques must be developed that permit the controller to communicate them to the computer in a timely and accurate manner. Random routing can be expected to complicate this problem considerably.

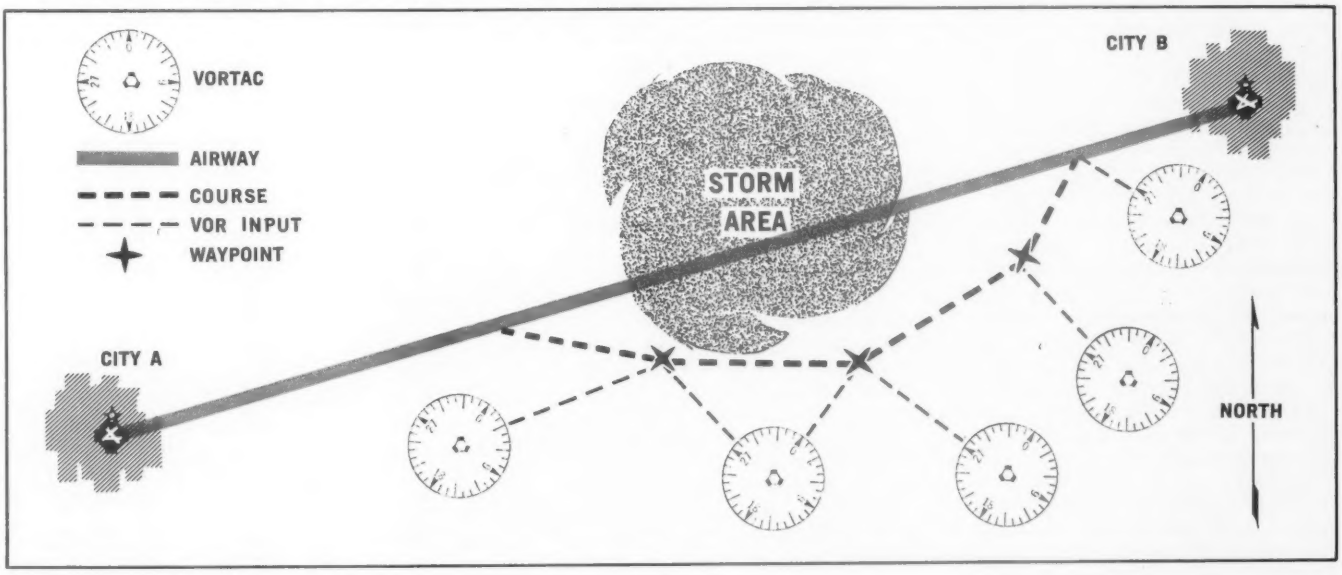
Area navigation, though not the answer to all our problems, does promise to be a significant step toward better service to the flying public.

Only a few of the problems and plans have been mentioned to illustrate the work yet to be done. No matter how desirable this system seems or the advantages it appears to offer, however, it cannot be introduced until we have the answers to vital questions of safety, suitability and economy.

Through the continued cooperation of private industry and FAA, we will, in the not too distant future, have the answers to these questions and open the way to bigger and better use of our most important natural resource—the sky overhead.

Robert W. Martin
Chief, ATC Operations and Procedures Division
FAA, Air Traffic Service

Instead of flying through storm area, pilot navigates by use of imaginary "way-points" on his selected course to avoid danger.



famous

FLIGHTS

Skirts in the Sky

Amelia Earhart with Lockheed Vega. Famed aviatrix mysteriously disappeared in the South Pacific on July 2, 1937, during round-the-world flight.

Above—Blanche Noyes, now with FAA, in 1929 photo after her flight from Santa Monica to Cleveland. **Right**—Katherine and Wilbur Wright in France, 1909.

ALMOST from the beginning, aviation has been a "his and hers" sport.

Ladies were flying before the skies were friendly. "Take me along" was a popular plea long before the day of business trips and excursion fares. Since the earliest years of powered flight, women have ventured boldly into the blue, and earned their share of aeronautic honors.

One of the first of America's lady-birds may have been Katherine Wright, sister of Wilbur and Orville, who flew with the boys both out of curiosity and as a token of confidence in their contraption. History doesn't record her immortal words as a pioneer female air passenger, but it was probably something like "Now, Wilbur, don't go too fast."

From the very start, any girl with the flying bee in her bonnet has had to adjust.

For example, Mrs. S. F. Cody, first Englishwoman to ride in a plane, tied her skirts around her knees and held on to her wide-brimmed hat. It apparently didn't occur to an English lady to go out in public without her hat, or, in those days, without her skirt, for that matter.

In 1909, Gertrude Bacon, another Britisher, begged a French pilot at the first international aviation meet in Rheims to take her for a ride, but before he would consent he insisted on visiting her in her hotel room . . . to weigh her. Accounts of that flight do not reveal the payload capacity of the plane, but they do report that the pilot flew very low during the joy ride with Miss Bacon. Which proves that Bacon by the pound wasn't very high in France in 1909.

Aviatrix Helene Dutrieu of France, pioneered pants as the appropriate flight suit for women and shocked the English when she appeared in Britain in her unladylike attire. She skirted that issue by going to America where, in 1911, she won $500 by flying for 37 minutes in an endurance contest with the other lady pilots.

A year earlier, Betty Scott had become the first American woman to solo—but the feat was accidental. It was September 2, 1910, and Betty was practicing taxi runs in a one-seater pusher-type aeroplane. Suddenly a gust of wind lifted the craft off the ground and there she was "flying" at 40 feet. Her teacher, Glenn Curtiss, who was to become one of the country's great aircraft designers, was terrified. "She could have wrecked the aeroplane," he said, and refused to accept another woman student.

The first female to solo intentionally was Bessica Raiche of Wisconsin, who was honored in 1910 by the Aeronautical Society of America as the "first woman aviator in America."

WITH women taking to the air, the Aero Club of America decided to require licenses of all pilots. Harriet Quimby, described as an extremely pretty girl, qualified for her license after only 32 minutes in a plane.

Harriet decided to be the first woman to fly across the English Channel, and on April 16, 1912, wheeled a Bleriot aeroplane she had never flown before out of a Dover hangar. She took off in the fog, equipped with a compass, a hot water bottle and the knowledge that if she strayed as much as five miles off course she could end up in the North Sea.

Just when her hot water bottle and her sense of direction were both beginning to grow cold, Harriet emerged from the fog and found herself over a coastline. She landed along the shore of a French fishing village where the surprised residents served her hot coffee on the beach and cautioned her about the perils of flying.

Mathilde Moisant, a friend of Harriet, was the second woman to win a pilot's license in the United States. In 1911, she set a world record by flying to an altitude of 3,000 feet. This achievement, together with her flight from Paris to London, served to elevate women to new heights in the competition for aviation "firsts." Then, shaken by news of Harriet Quimby's fatal crash in Boston and a few narrow escapes of her own, Mathilde retired from flying at the age of 26. Thirty years later, asked if she considered flying more dangerous than driving, she said, "I don't know, I've never learned to drive a car."

Two other early birds of aviation were Katherine Stinson and Ruth Law.

Katherine Stinson picked up the third woman's pilot license issued in this country at age 19. She quickly became a "daredevil," following men in looping the loop and outflying them by inventing a new maneuver which she called the "dippy twist loop." In 1916, she pioneered as a skywriter by attaching magnesium flares to her plane and sketching the letters CAL across the California night sky.

With the U.S. entry into World War I, Katherine wanted to volunteer as a fighter pilot, but the Army, apparently feeling that this would constitute an unfair advantage over the enemy, turned her down. She then went on a barnstorming fund-raising tour, collecting a remarkable $2 million in Liberty Bond pledges and Red Cross donations. She set other records as well: a 610-mile non-stop flight from San Diego to San Francisco, and a 9,000-foot mountain-clearing

flight over the Tehachapi Pass. She became famous as the only pilot ever to knit for the Red Cross while flying solo from city to city in an open airplane.

Ruth Law was also a dare-taker and a record-breaker. In 1915, she astounded spectators at a Birmingham air show by doing 16 consecutive loops. That same year she set out to be the new altitude champion.

In those days, planes had no altimeters. Pilots carried barographs aloft which, on return to earth, could be "read" by atmospheric pressure experts to determine altitude.

ARMED with a barograph but ill-equipped for the cold, Ruth circled upward until her fingers became numb and her senses fuzzy. She landed to learn that she had reached an altitude of 11,200 feet, more than double the previous record for a woman, but still short of the record for men.

Failing to be number one vertically, Ruth took off to break the non-stop distance record of 462 miles held by a man named Victor Carlstrom. Lacking maps or other naviagtion aids, Ruth scribbled known landmarks on the sleeve of her flying jacket, and literally flew "off the cuff" to a new distance record of 590 miles (a record eclipsed a few years later by Katherine Stinson's San Diego to San Fransico flight).

Ruth Law also flew in support of the war effort and even lobbied in Washington in support of a bill to permit women to join the Flying Corps. The bill failed. After the war Ruth returned to stunt flying, finally quitting in 1922, when a friend of hers was killed in a car-to-plane transfer stunt.

Others, like Marjorie Stinson (younger sister of Katherine), who at 18 became the nation's youngest woman pilot, and Bernetta Miller, who was the first to solo at night after waiting impatiently all day for the weather to clear, have helped to write the early history of aviation and, in so doing, to establish flying as a profession by no means limited to men.

John Demeter

Harriet Quimby, America's first woman pilot, learned to fly in a half-hour and later became the first woman to fly the English Channel.

BRIEFS

• FLYING BETWEEN FLORIDA, THE BAHAMAS, THE KEYS? Special Federal Aviation Regulation 15 requires an approved flight plan for all overwater flights south of 29° north latitude and all flights between the mainland and the Florida Keys. This area is under radar surveillance and unidentified aircraft are subject to interception by the Air Defense Command. Flight plans must be filed with air traffic control and approved by the appropriate military authority before flying into the area from either direction. All aircraft making such flights must be equipped with functioning navigation equipment and functioning two-way radios. This regulation is applicable whether or not the aircraft flies into an Air Defense Identification Zone (ADIZ).

• GENERAL AVIATION ACCIDENTS INVOLVING WEATHER are more than twice as likely to be fatal as non-weather-involved mishaps, according to a recent National Transportation Safety Board study of 1966 general aviation accidents. The report disclosed that 20.87 per cent of 896 general aviation weather involved accidents in 1966 were fatal, while only 7.97 per cent of non-weather accidents were deadly. The report, "Accidents Involving Weather as a Cause/Related Factor, General Aviation, 1966," together with "An Analysis of U. S. General Aviation Accidents "Involving Weather as a Cause/Related Factor, 1966," is available to the general public from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Va. 22151 for $3 a copy. The order number is PB-178984.

• THE AVIATION COMMUNITY is invited to FAA's first planning review conference to be held in Washington, D. C. Feb. 18-20. Following discussions of the national aviation system plan, the conference program, FY 1970 budget and the major requirements for the 1971-79 period, there will be seminars on topics such as aviation forecasting, air traffic control, communications, air navigation, airports and weather forecasting on the final two days. Inquiries should be directed to the Director, Office of Information Services (IS-1), Federal Aviation Administration, 800 Independence Ave., S.W., Washington, D. C. 20590.

• ADDITIONAL QUALIFIED CANADIANS in the aircraft maintenance trades are now authorized to perform certain aircraft maintenance tasks under recently issued amendments of FAR 43 and FAR 91. Under the ruling which became effective Nov. 29, 1968, Canadian mechanics who meet the qualifications detailed in the amendment may perform maintenance, preventive maintenance, alterations, and perform 100-hour inspections, provided they are done in accordance with FAR 43.13; 43.9; 43.15; or 43.11, whichever is appropriate. FAA also issued Notice of Proposed Rule Making 68-29 to amend FAR 91, 121 and 135 to eliminate inconsistent requirements for signalling devices on aircraft operated for compensation or hire.

A student pilot logging solo time in the Houston area, spotted what appeared to be a large dry bay area, apparently an ideal location to practice emergency landing procedures. But the simulated landing went amiss and the pilot was committed to an actual landing. Upon touchdown, the pilot made an abrupt discovery—the only thing dry about the landing area was a thin crust on top of a mud flat and the aircraft promptly upended. Unhurt, the pilot scrambled out, only to find himself mired waist deep in the muck, and in danger of sinking deeper. He managed to reach firm ground by "swimming" on his belly some 200 yards. Giant-wheeled marginal terrain equipment was needed to level the aircraft and skid it out of the muck. Moral: Look before you land! While it is good practice to be constantly on the lookout for emergency landing sites, don't invite trouble by making a pass at an unfamiliar flat before you've given it a close look. If in doubt, stay clear and save your gear.

SLIDE VIEWER IMPROVES SKILL IN PLANE SPOTTING

An ordinary 35mm slide projector mounted above the cabin of a light plane flight simulator makes an effective tool in teaching pilots to improve their ability to spot other aircraft in flight.

This is the conclusion reached after a series of tests at FAA's National Aviation Facilities Experimental Center near Atlantic City earlier this year. The tests also demonstrated that total pilot flight time is not a reliable yardstick to measure an individual's effectiveness in visual sighting of other aircraft.

During the tests, the projector flashed head-on stationary images of a series of 40 airplane silhouettes on a partial spherical screen 10 feet from the pilot. The silhouettes varied in size from one-inch to eight-inch wing spans to simulate different distances of airplanes on collision courses.

The projector was free to move through 360°, giving a realistic illusion of aircraft approaching from different angles, just as they would under actual flight conditions. An automatic timer added to the projector gave pilots from one to 60 seconds to locate intruder aircraft.

During the "flights" which were carried out as mock cross-country flights, the pilots were required to fly the simulator, refer to flight instruments, perform normal navigation tasks, and use the radio, all the while keeping a lookout for other aircraft. To make sure the pilots were keeping up their cockpit duties and not devoting full time to searching for intruders, flight instrument readings and panel warning light changes were introduced at irregular intervals.

The 15 pilots used in the tests had flight times ranging from as little as 15 hours to 1,600 hours. Each pilot flew 10 flights lasting from 35 to 40 minutes each.

Project manager Warren G. Crook and psychologist Dr. Richard L. Sulzer recommend that the low-cost equipment and training procedures be studied further by a flight training school using a standard set of training slides and also that the training be extended to pilots of larger aircraft.

Their report "Evaluation of Low-Cost Collision Avoidance Ground Training Equipment" is available for $3 a copy from the Clearinghouse for Federal Scientific and Technical Information (CSFT), Springfield, Va. 22151. Make check or money order out to CSFT when ordering.

All Rescue Stations World-wide Now Listed In International AIM

Pilots flying abroad now have at their fingertips a concise compilation of world-wide search and rescue facilities.

Appearing for the first time in FAA's *International Flight Information Manual,* the new 36-page section on emergency assistance tells pilots what procedures should be followed in emergencies in various countries, explains radio communications abroad and alternate methods of asking for help, and lists ground-air visual codes internationally recognized by search and rescue crews.

All rescue stations abroad are listed. The rescue stations are grouped under six major world regions: Caribbean-South America; North Atlantic; European-Mediterranean; Pacific; Middle-East-Southeast Asia; and African-Indian Ocean.

The *International Flight Information Manual* is available from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. The price is $1.25 per year (add 25 cents for foreign addresses), which includes quarterly supplements.

Aerostar 601 Joins Business Fleet After Completing FAA Certification

The Aerostar 601, a twin-engine, all metal, six-place monoplane with retractable tricycle landing gear has been certificated by FAA under Part 23 of the Federal Aviation Regulations (Aircraft of 12,500 pounds or less gross weight). The 601 weighs 5,700 pounds.

The aircraft is powered by two Lycoming IO-540 turbocharged engines of 290 h.p. each and can operate at 30,000 feet. The cabin is unpressurized but the plane is equipped with an oxygen supply system capable of serving all occupants.

FAA Aviation News welcomes comments from the aviation community. We will reserve this page for an exchange of views. No anonymous letters will be used, but names will be withheld on request.

• Medication in Orbit

As a physician, a private pilot, and lately a designated FAA Medical Examiner and Air Force Flight Surgeon, I have always understood that there were certain drugs which one should not take if one must function as pilot in command. Among those drugs was the chief ingredient in the oral anticongestive capsules or tablets.

Yet I understand that all three pilots of Apollo 7 suffered from head colds and took anti-congestive medication, even though they were flying a ship of infinitely greater complexity than my little bird.

Is there a double standard?

Benjamin P. Clark, M.D.
Hamburg, Penna.

A recent study of antihistamines and their effects on performance at ground level, 10,000 and 14,000 feet was completed by Dr. E. Arnold Higgins and his associates at FAA's Civil Aeromedical Institute. The study showed that the phenindamine compound did not statistically impair performance but the chlorpheniramine compound did. However, some undesirable side-effects did occur with the phenindamine compound.

The specialized medical, engineering and ground support aspects of the space program differ so markedly from those of civil aviation that criteria will understandably vary.

For specific details regarding effects of drugs on flight, we recommend the booklet, "Guide to Drug Hazards in Aviation Medicine", AC 91.11-1, available for 35 cents from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

• AIMless Pilot Thanks FSS

This is to thank the Prescott (Ariz.) FSS for the special effort made to contact me at Grand Canyon Airport and help set up my VFR flight plan when I was unable to use the direct line to your office. They certainly went out of their way to make sure I had all the necessary information.

While setting up the flight plan, the flight service specialist listed various call frequencies enroute and at destination. I asked the specialist how a pilot was to know all the special frequencies and he replied by saying they were all in the Airman's Information Manual (AIM).

For my family flying I cannot justify the cost of subscribing to AIM ($9.00) on top of $16.50 for National Pilots Association, and $2.00 for AVIATION NEWS, plus a few dollars more for other good aviation publications. Your magazine is part of FAA and I am a subscriber. FAA's special frequencies should be published therein.

Idylwild, Calif.

The list of special radio frequencies is far too long (about 10 pages) for FAA AVIATION NEWS. Frequency listings are published every 28 days in Part 3 of Airman's Information Manual. These frequencies will also soon be listed in the airport/facility (Part 2) directory section of AIM.

We believe that every active pilot should have a subscription to AIM for his own use. For airmen unable to do so, reading copies are available at all flight service stations.

• The Mills Grind Slowly

I like AVIATION NEWS very much, but I had just about reached the end of my patience waiting to receive the first issue after subscribing. It took several months from the time I mailed in my check and subscription blank before I got the first copy. Why all the delay?

Scranton, Penna.

When subscriptions are received at the Government Printing Office they are allowed to accumulate until a batch of 50 or so are at hand before they are processed. This makes for uneven response to new subscribers.

Two good points to observe are (1) send the subscription form and money order or check directly to the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402 (not to FAA) and (2) renew subscriptions promptly when alerted. A lapsed subscription can take as much time to resume as a new one to begin.

Two and three year subscriptions (at $4.00 or $6.00) are now accepted, as a convenience to subscribers.

• In the Bag

A half-dozen clear plastic sandwich bags, which take up no more space than a folded handkerchief, provide me with a ready supply of containers to use for draining gasoline during a preflight. The plastic bags are uncontaminated, readily at hand, and can be easily disposed of. No fuel spillage, instant water detection.

Eatontown, N.J.

• Department of New Ideas

Has any research been done on the use of Teflon as a covering for the leading edges of wings or other aircraft surfaces to reduce ice buildup?

Also, what research has been done on the use of helium or other lighter-than-air gas to increase load carrying capacity of aircraft?

Leonard A. Schulman
New York, N. Y.

FAA has plans for research work to determine the anti-icing and de-icing effect of an improved Teflon coating, along with other so called icephobic coating materials. Tests are planned for February and March, 1969, at the NASA-Cleveland Research Center Facility, using Cessna 175 wing sections.

Details on previous testing of Teflon as an anti-icing material are contained in a paper by E. L. Merkle, Douglas Aircraft Corp., obtainable from the Institute of Environmental Sciences, 940 E. Northwest Highway, Mt. Prospect, Ill. 60056. Price to members: $15; non-members, $16.

As for your question on using helium to augment lift for heavier-than-air aircraft, the basic fact that it requires 1,000 cubic feet of helium to provide 65 pounds of lift must be considered. Filling the unused cavities of any aircraft would provide only a fraction of the lift required for flight.

For example, the fuselage of a jet aircraft (145 feet long, with a 145 square feet cross section) would be approximately 20,000 cubic feet in volume. If the entire volume were filled with helium, eliminating passengers and baggage, the added lift would be 20 x 65 or 1,300 pounds approximately. The takeoff weight of the plane could be about 205,000 pounds without passengers and baggage. The added lift from the helium would be much less than one per cent of the takeoff lift required (205,000 lbs.) without providing for passengers and baggage.

• Clear and Not So Clear

I have observed that very few people yell that simple little warning "CLEAR!" anymore. I have worked as a gas boy and as a flight instructor, and it irks me to see a guy fire up his engine with his eyeballs glued straight ahead and mouth shut while gas trucks and people are still in the same area.

While I'm at it, I might as well mention that quite a few also forget to turn off their mags and master when fueling.

Michael Robbins
San Jose, Calif.

FARs 91.3, 91.9, and 91.10 clearly establish the responsibility of the pilot in this regard. Persistent bad habits may be called to the attention of an FAA inspector, or accident prevention specialist.

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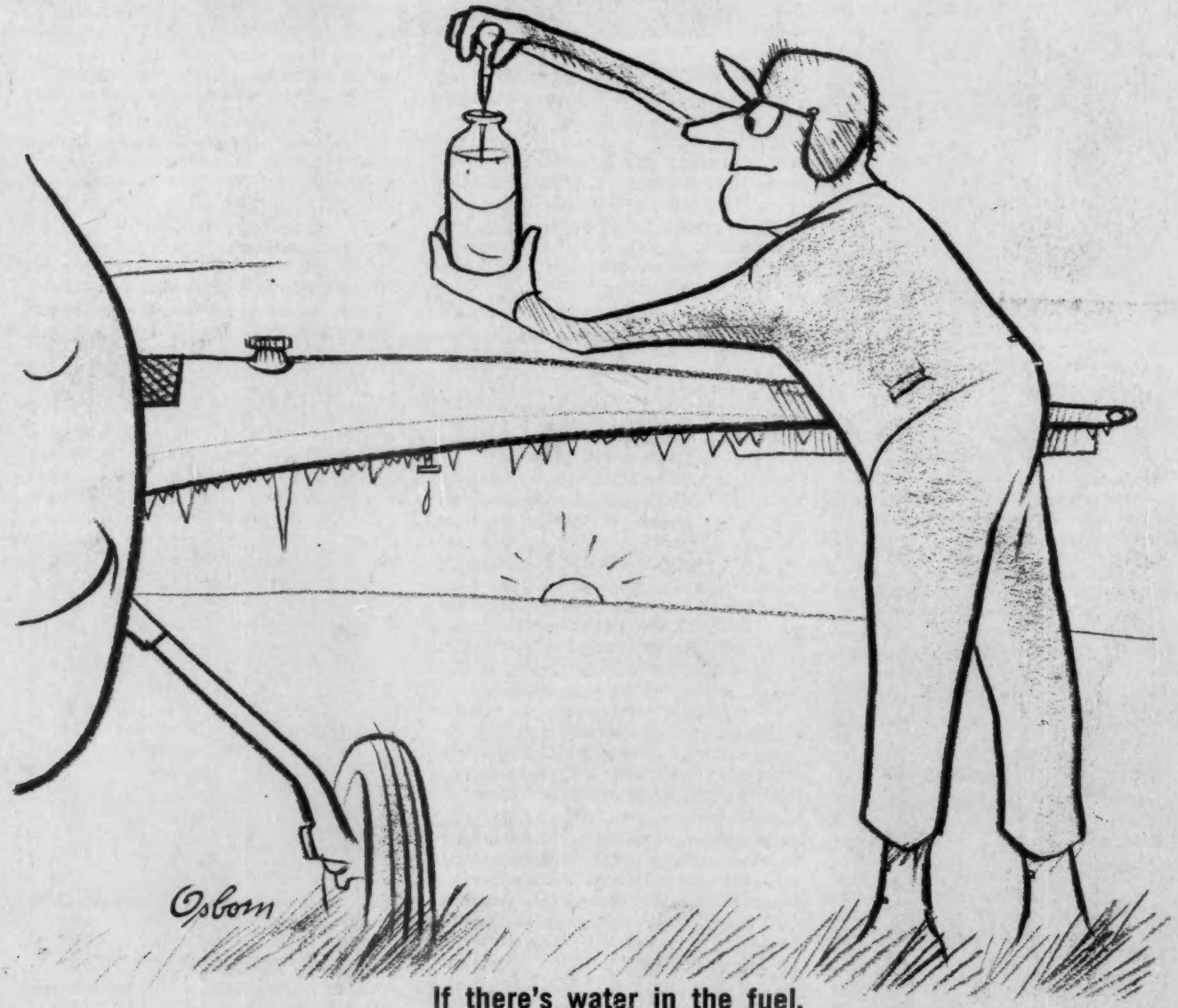
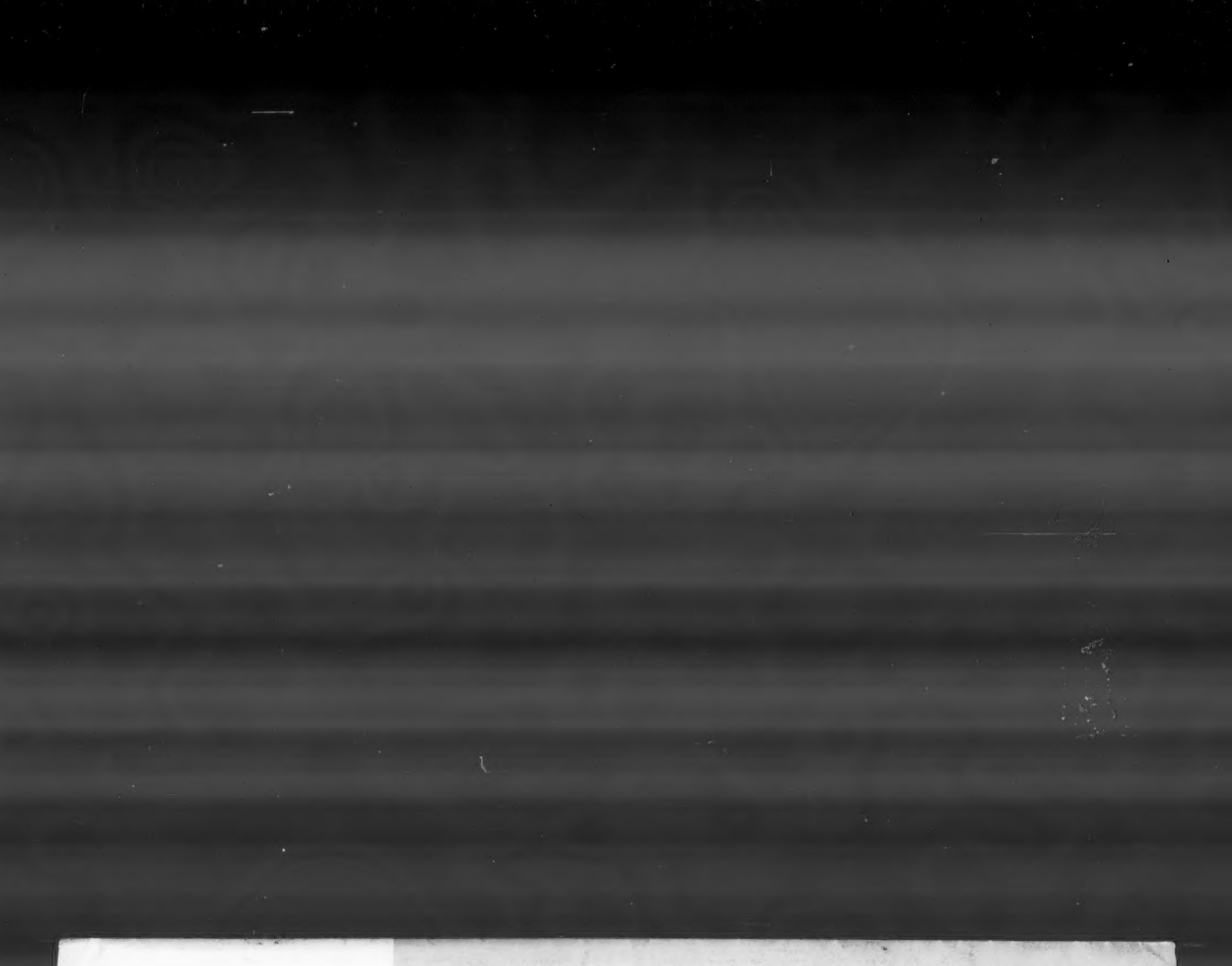


If there's water in the fuel.

Suggested by R. W. Brown, Jr.